



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Mountain-Prairie Region



BA WTR
WR CO
Mail Stop 60189

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

APR 12 1999

Memorandum

To: Project Leader, Arapaho National Wildlife Refuge
From: Chief, Division of Water Resources
Subject: 1998-99 Annual Water Use Report/Management Plan

The subject report for Arapaho National Wildlife Refuge has been reviewed and approved as submitted.

Attached is the Review/Approval page for your files. Thank you for the timely submission of this report and all the assistance in compiling water use data.

Attachment

**ARAPAHO NATIONAL WILDLIFE REFUGE COMPLEX
HUTTON LAKE NWR, BAMFORTH LAKE NWR,
MORTENSON LAKE NWR SATELLITES**

**ANNUAL WATER MANAGEMENT PLAN
1998 WATER USE REPORTS
1999 RECOMMENDATIONS**

Prepared:	<u>Pamela Rizer</u> Wildlife Biologist	Date:	<u>3/19/99</u>
Submitted:	<u>Mark Loring</u> Acting Project Leader	Date:	<u>3/19/99</u>
Approved:	<u>John McIver</u> GARD, Southern Ecosystems	Date:	<u>4-12-99</u>
Concur:	<u>Larry Shanks</u> Refuge Supervisor, Southern Eco.	Date:	<u>4/12/99</u>
Reviewed:	<u>Cheryl Wells</u> Chief, Div. of Water Resources	Date:	<u>4-7-99</u>

ANNUAL WATER MANAGEMENT PLAN 1998-1999

Arapaho National Wildlife Refuge

I. Introduction

Arapaho National Wildlife Refuge uses five primary sources of water to provide irrigation, maintain pond levels and sustain riparian vegetation for wildlife. These five sources are the Illinois River, Spring Creek, Antelope Creek, Soap Creek and Potter Creek. Sixteen different headgate structures divert water out of the Illinois River into more than 70 miles of primary delivery ditches. This water supplies over 77 ponds with over 807 surface acres of water and irrigates over 8,000 meadow acres during a normal year.

In 1998, the Illinois River opened in late March, allowing headgates to be opened earlier than normal. Actual cubic feet per second is not known, as the headquarters bridge River gauge was removed in 1995 for construction purposes. The gauge has not been replaced at this time, we hope the Water Commissioner will be able to replace it in the near future. River flows were high from mid April until early May. By the end of June, the river dropped dramatically from over approximately 200 cfs to less than 50 cfs. The northern portion of the River dried up in July for several weeks. The river froze in late November.

Headgates were opened in early April and ditches were ice free by late April. Wetland conditions for the spring were excellent with all ponds full and meadows irrigated. Low water in July prompted us to close most all headgates to keep the small amount of water available in the river. Many the wetlands were dry or less than half full by late August.

Precipitation in 1998 was 11.97 inches, 2.42 inches above normal, with snowfall measuring 54.1 inches in Walden. September was the warmest on record, reaching 89 degrees Fahrenheit on the 4th. Snow pack levels in the Illinois River drainage were normal in January 1999. The outlook for the spring is good if snow levels remain constant.

II. Purpose and Methods

Spring run-off is diverted from natural water courses into delivery ditches to provide wetlands and irrigation systems with water. Approximately 8,000 acres of meadows are flood irrigated to maintain and perpetuate quality nesting habitat for waterfowl, shorebirds and other wetland dependent birds. Numerous ponds are also managed via diverted water each year to provide breeding and brood rearing habitat for these same birds.

Current water management practices greatly depend on winter snow packs, spring moisture and downstream water demands. However, during normal water years, the following schedule is used to provide general guidance:

April - (spring breakup) Open river headgates as snow pack allows, striving for the earliest flows possible. This water will flow directly into ponds to create as much open water as possible to attract and hold migrating waterfowl. Drain upstream storage reservoirs (Case #1, #2, #3) on to lower units to initiate more open water. These reservoirs are then refilled with spring run-off water and held at optimum levels to provide breeding and brood rearing areas for water birds.

May - Initiate meadow irrigation as soon as ditches are ice-free and operable to provide optimum habitat for nesting waterfowl, shorebirds and other marsh birds. Perform ditch maintenance needed. Record water flow measurements weekly. Follow set water conservation schedule (Table I) for opening and closing of a select group of headgates to more efficiently use water from the Illinois River.

June - Maintain reservoir levels and continue irrigation to maintain habitat for nesting, and breeding birds. Record water flow measurements weekly. Follow water conservation schedule on select group of headgates.

July - Consolidate water as necessary to provide brood habitat for waterfowl, shorebirds and other wetland dependent birds. Record water flow measurements weekly. River flows can increase during this month, as off refuge irrigation ditches are shut-down for haying.

August - Begin repairs on dikes and control structures and any new construction projects. Most ditches will be closed by this time, water flow measurements will continue on all open ditches. Maintain minimal water flows in specific ditches to provide stock water as part of the Refuge Grassland Management Plan.

September - Prepare for scheduled winter fill of storage reservoirs as needed. Continue work on construction and repair projects. Record water flow measurements weekly on any ditches still open.

October - Winterize water system, drain irrigation ditches, "set" water system in preparation for spring run-off. Continue construction and repair work as needed. Initiate drawdown of ponds on schedule.

November - Normal freeze-up period. Pre-snowfall 'dirt work' still possible.

December - March - Normally cold, frozen conditions prevent water management. Nesting structures can be repaired/maintained and water management structures can be built.

III. 1998 Water Usage

Water usage is determined primarily by weekly recordings of water flows through Parshall flumes located just downstream from the various headgates or diversion structures in each irrigation ditch system. In the spring of 1997, Water Resource personnel from the RO and State Water Commission checked most of the Refuge flumes and determined that many were not reading accurately. They recommended a 'chip test' be used in order to achieve accurate measurements. The chip test was used this year on all flumes documented to be inaccurate. We will continue to use the 'chip test' in future years on all malfunctioning flumes. In instances where measuring devices have not been installed, estimates are made relative to the known water use in other irrigation systems in 1998.

A total of 15,929 acre feet of water was diverted in 1998, approximately 9,200 acre feet less than 1997. This large decrease is mainly weather and river flow dependent. Some efforts were made in the spring to manage irrigation waters more effectively by utilizing fewer acre feet from the drainage. Measuring the success of managing water flows more efficiently is hard due to the varying river flows over the years. This year with limited and inexperienced staff, success was minimal with approximately 1,000 acre feet less utilized, due to new management practices. Managing water utilization more efficiently will continue to be a main priority each spring.

Several misconceptions need clarification concerning the Refuge ditches and total acre feet of water used. The total acre feet comes from adding most ditch flume readings to estimates of acre feet of several spring fed ditches (Table II). It should be noted:

The Hubbard #2 ditch originates off the Illinois River. The Hubbard #3 (Rat Ditch), Hubbard #4 and the Hubbard Caudle Extension all originate off the Hubbard #2, therefore they are not added into the total acre feet diverted.

The Refuge shares water rights on the Midland, Everhard Baldwin and the Howard ditches and total acre feet for each of these ditches is as follows:

Midland Hackley - Acre feet diversion at flume is all Refuge water

Midland Ross - Midland flume reading minus the Hackley flume reading divided in half as $\frac{1}{2}$. The Refuge diverts approximately 50% or 5 cfs of the water, the rest of the water is Anderson's, as Burr's use their 5 cfs before the Midland flume.

Howard - half of the flume acre feet reading, the Refuge has 50% of the water right.

Everhard Baldwin - The Refuge owns 47% of the total acre feet, thus the flume acre feet reading is multiplied by .47.

The Oklahoma #1 flume reading is influenced by large volumes of non-Refuge secondary water during the irrigation season. So in many cases the total acre feet reading for this ditch is much higher than what is actually diverted by the Refuge. If possible, total acre feet should be an estimated amount of the flume reading and the headgate should be closed during the irrigation season.

IV. Proposed 1999 Water Use

Water use in 1999 will not be substantially different from that planned for previous years. If possible all wetlands will be filled as early as possible in the spring to maximize spring run-off use. Optimum water levels will be maintained for as long as possible to encourage waterfowl and other wetland dependent birds breeding, nesting and brood rearing.

One of the following general plans will be implemented dependent upon the availability of water in 1999:

Plan A - Average Water Year

1. Refuge ponds will be filled as early as possible to attract spring migrants to remain and nest. Two to three ponds will be held at 80 percent capacity to provide shoreline habitat for migrating shorebirds during May and early June.
2. Meadow areas will be irrigated by take-outs in the diversion ditches or sub-irrigated by seepage from the ditches.
3. As many ponds as possible will be maintained at optimum levels for as long as possible. If necessary some ponds may be sacrificed for more important brood ponds later in the summer.
4. Following the upstream irrigation season of hay meadows, increased flow in the Illinois River may be used to refill ponds in order to provide fall migrational habitat and reserve water for the following year.

Plan B - Extremely Wet Water Year

1. Marginal meadow areas not normally irrigated will be irrigated to provide additional wetland habitat for wildlife.
2. Additional water will be circulated through impoundments keeping them fresh, which will aid in the production of emergent and submergent vegetation and encourage invertebrates as sources of food and cover for wildlife.

3. Four to six ponds will be held at 80 percent capacity to provide shoreline habitat for migrating shorebirds during May and early June.
4. Water will run longer in the season keeping ponds relatively full at freeze-up. This will help ensure that at least some water will be available the following spring even in the event of a dry year.
5. By running the water longer, many small wetland depressions in the meadows can be maintained as brood rearing habitat, thus preventing concentrations of broods on a few ponds where they are more susceptible to predation and disease outbreaks.

Plan C - Extremely Dry Water Year

1. Fill as many ponds as possible to capacity and maintain to provide water for breeding and nesting pairs and cover for broods and molters.
2. Irrigate Refuge meadows adjacent to permanent bodies of water.
3. Irrigate Refuge meadows further removed from permanent ponds as available water permits.
4. Review implementation of drawdowns to conserve as much water in the most important ponds for as long as possible.

V. Planned Drawdown

A new drawdown plan was established last year, initiated in the fall and will continue this year. Scheduled drawdowns may be canceled or postponed if the prevailing water condition so dictates. Lack of water can effectively result in an unscheduled drawdown for certain ponds and may be used as such even if it does not coincide with the existing plan (Table III).

Water management is sometimes dictated by priorities set for rehabilitation of dikes and control structures. As more rehabilitation is accomplished many of the ponds will take their turn in drawdown status.

VI. Comments and Problems

The following water management related projects were accomplished in 1998.

1. The main water control structure in Potter Creek Pond was replaced.
2. A new Parshall flume was installed in the Hackley ditch.

3. Several large blow outs in the Hubbard-Caudal Extension, Midland and Oklahoma #1 ditches were repaired.
4. Rat Ditch, Old Road, N. McCammon, Diversion, Anderson Drain, and Abraham dikes were all rehabilitated.
5. The water control structure in 404 Pond was removed and replaced with a new plastic structure.
6. The BLM section of the Lateral B ditch was cleaned by a private contractor to facilitate water flows to prove up on a conditional right.
7. Several days were spent cleaning lateral ditches on the Hampton tract.

The following work, not in priority order, is needed and will be accomplished as manpower and working conditions permit:

1. Install water control structures into N. & S. Hackley, Rodriguez, and Headwaters ponds.
2. Determine surface acreage and storage capacity for several existing ponds and all new ponds to verify surface acres and storage capacities.
3. Install and or rehab Parshall flumes as needed, including Midland Extension, Midland Anderson, Midland Ross, Hubbard #4.
4. Replace deteriorating or missing river headgates on the Hubbard #2, Hill & Crouter, Dryer, Ward #2, and Ish Baldwin ditches.
5. Continue ditch clean-outs as time and money permit (by contract if possible).
6. Measure capacity of Fish Hatchery spring (Potter Creek) to determine amount of water flowing into Potter #2 ditch.
7. Rehab North Allard Contour and Case #3 Contour dikes.
8. Rehab N. School Section water control structure and outlet of Hampton #2 Dike.
9. Construction of Graf, Schroeder, Willet and Wigeon ponds on Soap Creek and Hampton tracts.

Table I

Headgate Name	Restrictions	Schedule
Boyce Brothers	Refuge has full water right.	Open two weeks, close one week rotation.
Dryer	Refuge has full water right.	Open one week, close two weeks rotation.
Everhard Baldwin	Shared water right.	Refuge does not have control of headgate.
Hill & Crouter	Refuge has full water right	Open one week, close one week rotation.
Home #1	Shared water right	Refuge must provide water to private landowner downstream.
Howard	Shared water right	Refuge does not have control of headgate.
Hubbard #1	Refuge has full water right	Open one week, closed two weeks.
Hubbard #2	Refuge has full water right	Potential to open three weeks, close one. This is an extremely long ditch and the life blood to the Case tract (major water bird production area).
Ish Baldwin	Shared water right	Refuge does not have control of headgate.
Midland	Shared water right	Refuge does not have control of headgate.
North Park #6	Refuge has full water right	Open one week, close one week rotation.
Oklahoma #1	Refuge has full water right	Open in April, close during irrigation season, re-open after irrigation if needed.
Oklahoma #2	Refuge has full water right	Open two weeks, close one week rotation.
Ward #1	Refuge has full water right	Open two weeks, close one week rotation.
Ward #2	Refuge has full water right	Headgate not operable.
Ward #3	Refuge has full water right	Open two weeks, close one week rotation.

Rotations will start in May and run until river flows are low or season of use is over (First Part of August).

Table II

DITCH	REFUGE 1998 ACRE FEET DIVERTED	REFUGE 1997 ACRE FEET DIVERTED
Antelope**	225	250
Boyce Brothers	415	1468
Dryer	38	253
Everhard Baldwin	1116	1003
Hill & Crouter	64	268
Home #1	738	2222
Howard	1208	1320
Hubbard #1	163	75
Hubbard #2	5389	7485
Hubbard #3 (Rat)*	705	708
Hubbard #4*	2243	3000
Hubbard Caudle*	2441	2557
Ish Baldwin**	100	150
Midland (Ross)	1431	2364
Midland (Hackley)	262	261
Midland (Curtis)	765	-
North Park #6	229	714
Oklahoma #1	1041	1365
Oklahoma #2	82	1012
Potter #2**	175	200
Riddle Ditch	573	752
State Walden**	500	500
State Walden Res.**	35	35
Ward #1	1152	2844
Ward #2**	76	504
Ward #3	152	73
TOTAL	15929	25118

* Recorded under Hubbard #2.

** These figures are estimates.

Table III

POND	DATE	PRESCRIPTION	STATUS
Home Pond	October 1998	Release water to Illinois River. Keep pond dry through summer refill fall of 1999.	Water released pond dry in November.
Hampton #2 Pond	Late October 1998	Release water to Potter Creek. Keep pond dry through summer, refill fall of 1999.	Water released pond dry in November.
W. Fish Hatchery	October 1998	Release water to E. Fish Hatchery. Keep pond dry through summer, refill fall of 1999.	Water released pond dry in November.
Eagle Pond	Late October 1999	Release water into Rat Ditch. Keep pond dry through summer, refill fall of 2000.	On Schedule.
Elk Pond	October 1999	Release water to '76 and Reservoir #2. Keep pond dry through summer, refill fall of 2000.	On Schedule.
Reservoir #1	Tentatively October 2000 If MMS funding for dike rehab can be obtained.	Release water to Goose Pond. Keep pond dry through summer and fall, refill spring of 2001.	On Schedule.
S. School Section Pond	October 2000	Release water to N. School Section. Keep pond dry through summer refill fall of 2001.	On Schedule.
Brockner Pond	October 2000	Release water to meadow. Keep pond dry through summer, refill fall of 2001.	On Schedule.
Birdie Pond	Late October 2001	Release water to Rat Ditch. Keep pond dry through summer, refill fall of 2002.	On Schedule.
Reservoir #2	October 2001	Release water to Annex Pond. Keep pond dry through summer, refill fall of 2002.	On Schedule.

Schedule is subject to change if dike work is needed on a specific pond.

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1998 DITCH DIVERSIONS

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YEAR	POND	POND POINT OF DIVERSION	SURFACE	A F			
CONST.	POND NAME	QTR(S) - SEC - TWN - RGE	ACRES	CAP	SOURCE	REMARKS	
DITCH: <u>BOYCE BROTHERS DITCH</u>				MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED:	415	
1980	BROCKER POND, NORTH	NE 4 8N 79W	14.95	37	ILLINOIS RIVER		
		Ditch Total - Pond Use:	14.95 ----	37 AF			
DITCH: <u>HOME DITCH #1</u>				MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED:	738	
1978	HOME POND	NW SW N 33 9N 79W	27.05	68	ILLINOIS RIVER		
		Ditch Total - Pond Use:	27.05 ----	68 AF			
DITCH: <u>HUBBARD DITCH #2</u>				MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED:	5,389	
1976	BIRDIE POND	SW 20 8N 80W	3.44	9	ILLINOIS RIVER	to #3, #4 & Hub/Caudle	
1976	EAGLE POND	NW NW S 20 8N 80W	7.74	22	ILLINOIS RIVER	to #3, #4 & Hub/Caudle	
1985	SOLBERG POND	S1/2 SW 20 8N 79W	8.60	22	ILLINOIS RIVER	to #3, #4 & Hub/Caudle	
		Ditch Total - Pond Use:	19.78 ----	53 AF			
DITCH: <u>HUBBARD DITCH #3 (Rat) - #2 Lateral</u>				MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED:	0	
1974	ANTELOPE POND	N1/2 SW 7 8N 80W	22.42	77	ANTELOPE SPRINGS		
1972	BUDDY'S POND	SE 13 8N 80W	6.93	17	ILLINOIS RIVER		
1987	DIVERSION POND	SE 20 8N 79W	7.93	20	ILLINOIS RIVER		
1986	EISEMANN POND	NW SE 18 8N 80W	5.29	15	ILLINOIS RIVER		
NATL	GOOSE POND	SE 13 8N 80W	15.52	49	ILLINOIS RIVER	& #4	
1972	LIVING ROOM POND	SE NE S 13 8N 80W	2.41	6	ILLINOIS RIVER	& #4	
NATL	MARSH POND	SE 13 8N 80W	12.58	31	ILLINOIS RIVER	& #4	
1985	MUSKRAT POND	NW 7 7N 80W	99.00	390	ILLINOIS RIVER	& #4	
1987	OLD ROAD POND	NW 20 8N 79W	1.87	5	ILLINOIS RIVER		
1986	PATTEN POND	SW SE 18 8N 79W	3.30	10	ILLINOIS RIVER		
1986	PRAIRIE DOG POND	SW NE S 18 8N 79W	4.95	18	ILLINOIS RIVER		
1987	RAT DITCH POND	NW 20 8N 79W	2.82	7	ILLINOIS RIVER		
1972	ROADSIDE POND, NORTH	SW SE N 12 8N 80W	2.24	6	ILLINOIS RIVER	& #4	
1972	ROADSIDE POND, SOUTH	SE NW N 13 8N 80W	2.42	6	ILLINOIS RIVER	& #4	
		Ditch Total - Pond Use:	189.68 ----	657 AF			
DITCH: <u>HUBBARD DITCH #4 - #2 Lateral</u>				MEAS. FLUME: N	ANNUAL AF AMOUNT DIVERTED:	0	
1986	#125 POND	NE SE 19 8N 79W	6.62	17	ILLINOIS RIVER		
1976	#76 POND	SW SE 12 8N 80W	25.06	63	ILLINOIS RIVER		
NATL	ALKALI POND	NE 11 8N 80W	12.79	32	ILLINOIS RIVER		
NATL	AVOCET POND	SE 11 8N 80W	8.52	21	ILLINOIS RIVER		
NATL	BLUEBILL POND	SE 14 8N 80W	6.22	19	ILLINOIS RIVER		
1978	BREWERS POND	SW NW 14 8N 80W	23.37	60	ILLINOIS RIVER		
1981	BULRUSH POND	NW NW 12 8N 80W	9.74	24	ILLINOIS RIVER		
1977	CASE CONTOUR, MIDDLE	NW NW 13 8N 80W	1.06	3	ILLINOIS RIVER		
1977	CASE CONTOUR, NORTH	NW 13 8N 80W	1.35	3	ILLINOIS RIVER		
1977	CASE CONTOUR, SOUTH	SW NW 13 8N 80W	1.08	3	ILLINOIS RIVER		
NATL	CASE RES. #2 ANNEX POND	NW 13 8N 80W	5.69	14	ILLINOIS RIVER		
1970	CASE RESERVOIR #1	SE SW S 13 8N 80W	26.40	124	ILLINOIS RIVER	decreed	
1952	CASE RESERVOIR #2	SW NW 13 8N 80W	28.30	106	ILLINOIS RIVER	decreed	
1952	CASE RESERVOIR #3	NE NE 15 8N 80W	15.13	67	ILLINOIS RIVER	decreed	
1980	CATTAIL POND	SW SE 12 8N 80W	4.06	10	ILLINOIS RIVER		
1976	ELK POND	NW SW 13 8N 80W	34.88	90	ILLINOIS RIVER		
1980	GREASEWOOD POND	SW SW 12 8N 80W	4.41	11	ILLINOIS RIVER		

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1998 DITCH DIVERSIONS

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YEAR	POND	POND NAME	POND POINT OF DIVERSION	SURFACE	A F	SOURCE	REMARKS
CONST.			QTR(S) - SEC - TWN - RGE	ACRES	CAP		
1993	HEADWATERS POND		NE SW 24 8N 80W	11.90	30	ILLINOIS RIVER	
1975	HORSESHOE POND		SE NE 15 8N 80W	0.92	2	ILLINOIS RIVER	
NATL	KITCHEN POND		SW 13 8N 80W	4.07	10	ILLINOIS RIVER	
1979	N. TOUR ROUTE POND		SE 14 8N 80W	0.76	2	ILLINOIS RIVER	
1974	POTTER CREEK POND		NE SE 12 8N 80W	35.98	111	ILLINOIS RIVER	
1979	S. TOUR ROUTE POND		SE 14 8N 80W	0.76	2	ILLINOIS RIVER	
1986	VARNEY POND		N1/2 SW 19 8N 79W	9.71	24	ILLINOIS RIVER	
1978	WILSONS POND		SW SW S 11 8N 80W	6.75	17	ILLINOIS RIVER	

Ditch Total - Pond Use: 285.53 ---- 865 AF

DITCH: HUBBARD/CAUDLE EXT - Hubbard #2 Lateral MEAS. FLUME: Y ANNUAL AF AMOUNT DIVERTED: 0

1992	403 POND	NE NW 18 8N 79W	0.50	1	ILLINOIS RIVER
1992	404 POND	NW NE 18 8N 79W	3.18	8	ILLINOIS RIVER
1987	ABRAHAM POND	NE 20 8N 79W	6.25	20	ILLINOIS RIVER
1987	FOLLETT POND	NW 20 8N 79W	2.99	10	ILLINOIS RIVER
1990	HAMPTON #1 POND	SE 5 8N 79W	1.14	3	ILLINOIS RIVER
1977	HAMPTON #2 POND	NE SE 5 8N 79W	6.67	22	ILLINOIS RIVER
1978	HAMPTON #3 POND	NW SE 5 8N 79W	7.46	25	ILLINOIS RIVER
1987	RIZOR POND	NE 20 8N 79W	3.51	11	ILLINOIS RIVER
1981	SMITH POND	SW SE N 20 8N 79W	8.03	20	ILLINOIS RIVER

Ditch Total - Pond Use: 39.73 ---- 120 AF

DITCH: MIDLAND-HACKLEY DITCH MEAS. FLUME: Y ANNUAL AF AMOUNT DIVERTED: 262

1974	GERM POND	SW NE 12 7N 80W	7.54	28	ILLINOIS RIVER
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Ditch Total - Pond Use: 7.54 ---- 28 AF

DITCH: MIDLAND-ROSS DITCH MEAS. FLUME: N ANNUAL AF AMOUNT DIVERTED: 1,431

1993	HACKLEY POND NORTH	SW SW 12 7N 80W	4.30	11	ILLINOIS RIVER
1993	HACKLEY POND SOUTH	SW SW 12 7N 80W	3.60	9	ILLINOIS RIVER
1993	RODRIGUEZ POND	NW NE 12 7N 80W	11.07	28	ILLINOIS RIVER
1982	ROSS POND	SE NE 1 8N 80W	4.37	11	ILLINOIS RIVER

Ditch Total - Pond Use: 23.34 ---- 59 AF

DITCH: NATL RUNOFF-NO DITCH MEAS. FLUME: N ANNUAL AF AMOUNT DIVERTED: 0

1992	FOX POND	SE NW N 10 8N 79W	48.00	108	SPRING CREEK	decreed
1980	SPRING CREEK POND	S1/2 NE 15 8N 79W	26.15	63	SPRING CREEK	decreed

Ditch Total - Pond Use: 74.15 ---- 171 AF

DITCH: OKLAHOMA DITCH #1 MEAS. FLUME: Y ANNUAL AF AMOUNT DIVERTED: 1,041

1981	ALLARD CONTOUR, MIDDLE	S1/2 NW 29 8N 79W	4.03	10	ILLINOIS RIVER
1981	ALLARD CONTOUR, NORTH	N 1/2 29 8N 79W	2.85	7	ILLINOIS RIVER
1981	ALLARD CONTOUR, SOUTH	NW 29 8N 79W	4.43	11	ILLINOIS RIVER
NATL	ANDERSON CONTOUR	S1/2 5 7N 79W	9.06	23	ILLINOIS RIVER
NATL	ANDERSON DRAIN	S1/2 5 7N 79W	14.01	35	ILLINOIS RIVER
1979	COYOTE POND	SW 20 8N 80W	1.52	4	ILLINOIS RIVER
NATL	FISHERMAN'S PARKING POND	NE 5 7N 79W	0.37	1	ILLINOIS RIVER
1970	POTHOLE POND	NW 5 8N 79W	3.40	9	ILLINOIS RIVER

Ditch Total - Pond Use: 39.67 ---- 100 AF

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YEAR	POND	POND POINT OF DIVERSION	SURFACE	A F			
CONST.	POND NAME	QTR(S) - SEC - TWN - RGE	ACRES	CAP	SOURCE	REMARKS	
DITCH: OKLAHOMA DITCH #2							
			MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED: 82			
1978	ALLARD POND, NORTH	NW SW N 5 8N 79W	13.98	38	ILLINOIS RIVER		
1978	ALLARD POND, SOUTH	SW NE S 5 8N 79W	15.16	48	ILLINOIS RIVER		
Ditch Total - Pond Use:			29.14 ----	86 AF			
DITCH: POTTER DITCH #2							
			MEAS. FLUME: N	ANNUAL AF AMOUNT DIVERTED: 175			
1950	EAST FISH HATCH POND	NW SE 15 8N 80W	2.19	8	FISH HATCHERY SPRING		
1950	WEST FISH HATCH POND	N1/2 S1 15 8N 80W	0.93	2	FISH HATCHERY SPRING		
Ditch Total - Pond Use:			3.12 ----	10 AF			
DITCH: WARD DITCH #1							
			MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED: 1,152			
1972	MCCAMMON POND, NORTH	NW NE N 21 8N 79W	3.52	9	ILLINOIS RIVER		
1978	MCCAMMON POND, SOUTH	SE NW N 21 8N 79W	13.68	41	ILLINOIS RIVER		
1980	WILLFORD POND	NW NE N 15 8N 79W	15.55	62	ILLINOIS RIVER		
Ditch Total - Pond Use:			32.75 ----	112 AF			
DITCH: WARD DITCH #3							
			MEAS. FLUME: Y	ANNUAL AF AMOUNT DIVERTED: 152			
1978	SCHOOL POND, NORTH	S1/2 NW 16 8N 79W	11.13	30	ILLINOIS RIVER		* AND HUBBARD DITCH #1
1978	SCHOOL POND, SOUTH	SW SW S 16 8N 79W	10.65	27	ILLINOIS RIVER		* AND HUBBARD DITCH #1
Ditch Total - Pond Use:			21.78 ----	57 AF			

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YEAR	POND	POND POINT OF DIVERSION	SURFACE	A F		
CONST.	POND NAME	QTR(S) - SEC - TWN - RGE	ACRES	CAP	SOURCE	REMARKS

The majority of water diverted is utilized for meadow irrigation.

The amount captured in ponds is incidental to this irrigation.

Note: Use under Hubbard #3, #4 and Hubbard Caudle Extn. are included under Hubbard #2 Ditch totals.

T O T A L S

POND Surface Acres - 808

DITCH DIVERSION - 10,837 AF ** GRAND TOTAL 15,929 AF

POND CAPACITY - 2,423 AF

Pond & Meadow Irrigation - 8,414 AF ** GRAND TOTAL 13,506 AF

MEADOW IRRIGATION

ANNUAL

No PondsAF DIVERTED

ANTELOPE DITCH	225
DRYER DITCH	38
EVERHARD & BALDWIN DITCH	1,116
HILL & CROUTER DITCH	64
HOWARD DITCH	1,208
HUBBARD DITCH #1	163
ISH & BALDWIN DITCH	100
MIDLAND-CURTIS	765
NORTH PARK DITCH #6	229
RIDDLE DITCH	573
STATE WALDEN PIPELINE	500
STATE WALDEN RES.	35
WARD DITCH #2	76

** Plus ACRE FEET TOTAL: 5,092